Wednesday, September 1, 2021
9:05 AM

Biconditional Statement $p \leftrightarrow q$

p iff q

A NASC for p is q

" " q is p

$(p \to q) \wedge (q \to p)$ — p implies q & is implied by q

$p \leftrightarrow q$ is True if both p & q have same truth values

otherwise False

$p \leftrightarrow q \equiv \sim(\quad)$

(a) $p \vee q$ (b) $p \wedge q$ (c) $p \oplus q$ (d) NOT

p	q	$p \to q$	$q \to p$	$r \wedge s$	$p \oplus q$
T	T	T	T	T	F
T	F	F	T	F	T
F	T	T	F	F	T
F	F	T	T	T	F

r s

$Mdx + Ndy = 0$ is an exact Diff. Eqn

iff $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

Let p be the statement "You can take the flight," and let q be the statement "You buy a ticket." Then $p \leftrightarrow q$ is the statement "You can take the flight if and only if you buy a ticket.

Construct the truth table of the compound proposition $(p \vee \neg q) \to (p \wedge q)$

p	q	$\sim q$	$p \vee (\sim q)$ r	$p \wedge q$ s	$r \to s$
T	T				T
T	F				F
F	T				T
F	F				F

F						
F	F				F	

TABLE 8
Precedence of Logical Operators.

Operator	*Precedence*
$\neg$	1
$\wedge$	2
$\vee$	3
$\rightarrow$	4
$\leftrightarrow$	5

Precedence of Logical operators

$p \vee \sim q \rightarrow (p \wedge q)$

ILATE $\{ p \vee (\sim q) \rightarrow (p \wedge q)$

$p \vee \sim q \rightarrow p \wedge q$

How can this English sentence be translated into a logical expression? "You can access the Internet from campus only if you are a computer science major or you are not a freshman.

p: You can access the internet from the campus.

q: You are a CS major

r: " " " freshman.

$a \rightarrow b$

a only if b

(a) $p \rightarrow (q \wedge \sim r)$

(b) $q \wedge r \rightarrow p$

(c) $q \wedge \sim r \rightarrow \sim p$

(d) NOT

$p \rightarrow (q \vee \sim r)$

$\sim q \wedge r \rightarrow \sim p$

$a \rightarrow b \quad \sim b \rightarrow \sim a$

$p \rightarrow (q \vee \sim r) \quad \sim (q \vee \sim r) \rightarrow \sim p$

$\sim(a \vee b) \equiv \sim a \wedge \sim b$

$\sim(a \wedge b) \equiv \sim a \vee \sim b$

De Morgan's Law

$\sim q \wedge \sim(\sim r) \rightarrow \sim p$

$\sim q \wedge r \rightarrow \sim p$

How can this English sentence be translated into a logical expression? "You cannot ride the roller coaster if you are under 4 feet tall unless you are older than 16 years old."

p: You can ride the RC

q: You are under 4 feet tall.

r: " " older than 16 years

(a) $\sim p \rightarrow q \wedge r$ (b) $q \wedge r \rightarrow \sim p$ (c) $q \wedge \sim r \rightarrow \sim p$ (d) NOT

$q \wedge (\sim r \rightarrow \sim p)$ $p \rightarrow \sim q \vee r$

$q \wedge r \rightarrow p$

$\sim q \wedge r \rightarrow p$

$\sim q \wedge \sim r \rightarrow p$